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Geology of the Quinn Lake Area District of Algoma

by
G.M. Siragusa

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FIGURE

1. Key map showing location of Quinn Lake area iv

MAP

(back pocket)

Map P.2580 (uncoloured)—Geology of the Quinn Lake Area, District of Algoma. Scale 1:15 840.

ABSTRACT

The Quinn Lake map-area is located about 100 km northeast of Sault Ste. Marie and comprises all of Wlasy Township and parts of Bracci, Way-White, Gaudry, Gapp, Desbiens, Scriven, Schembri, and Running Townships, for a total area of about 265 km^2. The area is underlain entirely by metamorphosed, Early Precambrian volcanic, sedimentary, and granitic rocks, except for swarms of northwest-trending diabase dikes of Middle to Late Precambrian age.

Metamorphosed Early Precambrian basaltic flows containing subordinate intermediate pyroclastic metavolcanics and magnetite ironstone, minor felsic metavolcanics, and metasedimentary interbeds underlie western parts of the map-area. These rocks are part of the eastern margin of the northwest-trending lobe of supracrustal rocks of the Batchawana belt. Most of the map-area is underlain by granitic rocks which consist essentially of porphyritic quartz monzonite, bordered by a discontinuous fringe of migmatitic rocks. Numerous Middle to Late Precambrian diabase dikes cut the granitic and supracrustal rocks.

The main structure in the portion of the map-area underlain by metavolcanics is a northwest-trending, southwest-facing, subvertical to overturned homoclinal sequence, the lower sections of which consists of intermediate pyroclastic units of limited lateral extent intercalated with effusive basaltic phases. This structure has been partially deflected and disrupted by deformation associated with the emplacement of granitic rocks.

Iron in magnetite ironstone is to date the only metal found in economically significant concentrations in the metavolcanics of the Quinn Lake area. Analyses of iron ore from several bands of ironstone in the Butter Tin-Boyle Lakes area of northern Gapp and southern Wlasy Townships show very low titanium content and 24.1 to 38.0 weight percent iron; the reserves of potential ore may be in the order of 150 million tons.

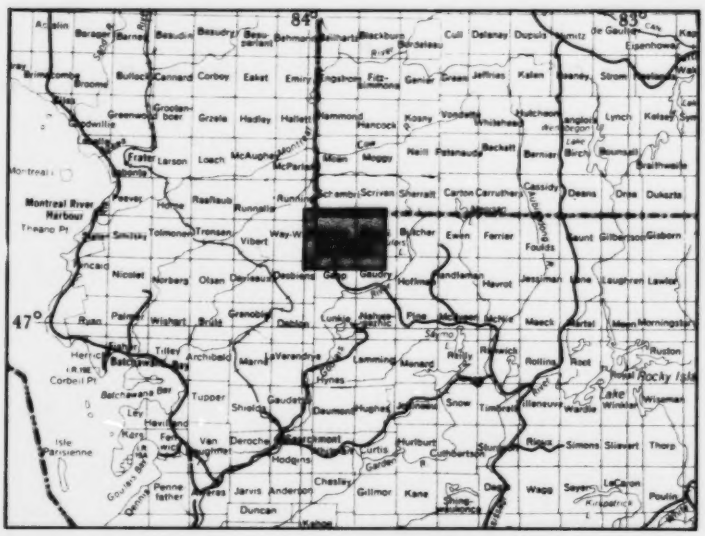

Figure 1. *Key map showing location of the Quinn Lake area.*

Geology of the Quinn Lake Area

District of Algoma

by
G.M. Siragusa[1]

INTRODUCTION

LOCATION AND ACCESS

The Quinn Lake area is bounded by Latitudes 47°07'30" and 47°15'N and Longitudes 83°45' and 84°00'W. The area includes Wlasy Township, the western two thirds of Bracci Township, an eastern strip of Way-White Township, northern portions of Gaudry, Gapp, and Desbiens Townships, and southern portions of Scriven, Schembri, and Running Townships, for a total of 265 km^2. A bush road approximately 53 km long connects the southern tip of Quinn Lake (northern Gapp Township) with the village of Searchmont, and thence with Heyden via Highway 556, and Sault Ste. Marie via Highway 77; the distance from Quinn Lake to Sault Ste. Marie via Searchmont and Heyden is about 104 km. Winter lumber roads intersect parts of the map-area but owing to their poor condition they offer no practical means of communication within the area. Many lakes are scattered throughout the map-area, and of these Quinn, Little Quinn, Hodgson, Snyder, Browne, Point, Chubb, North Chubb, Emerson, and Vacher Lakes are access points by float-equipped fixed-wing aircraft. Most of the lakes in the westernmost part of the map-area are either too small or too shallow (e.g. Dismal Lake) for fixed-wing aircraft, and the only practical means of access to this area is by helicopter. The drainage system of the map-area includes many small streams, the large majority of which are not suitable as canoe routes because of the shallowness of the water during most of the summer, and the abundance of log jams and beaver dams.

PHYSIOGRAPHY

The map-area is characterized by hilly physiography with elevations which are mostly 420 to 480 m above sea level at valley bottoms and lake surfaces, and 530 to 600 m at hill tops. Although the relief is relatively great, the terrain is not rugged owing to the dominantly gentle gradients of the hill slopes. The western margin of the map-area is dominantly flat with a few swampy zones, generally has elevations of about 400 m above sea level, and is locally hummocky. The drainage of the area is largely controlled by northeast-trending and, to a lesser extent, northwest-trending broad valleys, and includes many streams which may be up to few metres wide but are usually quite shallow. Quinn River, the main waterway of the area, drains southwest and connects Little Quinn Lake with Quinn Lake via two small northeast-trending lakes. Main segments of this river are vegetation-free meandering channels through relatively wide marshes, with only a few beaver dams, and are easily accessible by light-weight canoe.

The map-area has been extensively glaciated and is thoroughly veneered by variably thick overburden and mixed forest. Small outcrops are numerous throughout the area and conspicuous exposures are essentially restricted to the shorelines of some of the larger lakes such as Quinn, Little Quinn, and Dyson Lakes.

The small size and scattered distribution of outcrops in many parts of the area make it difficult to infer the lateral extent of the lithologic units involved.

PREVIOUS GEOLOGICAL WORK

Western parts of the map-area were covered by mapping carried out by E.S. Moore in 1924 at the scale of 1:63,360 (Moore 1925).

PRESENT GEOLOGICAL WORK

Areas underlain by supracrustal rocks were mapped from lakeshore and by pace-and-compass traverses at intervals of approximately 400 m or less, where this was warranted by sufficient outcrop density. In the planning of tie-lines between outcrop areas, the criteria were outcrop size, expected bedrock exposure, and aeromagnetic expression of the bedrock. In traversing granitic terrain, tie-lines connecting hill tops and/or along ridges were the most productive in locating outcrops, and were used extensively in place of traversing at fixed intervals. Acetates overlain on air photographs supplied by the Air Photo Library of the Ministry of Natural Resources, at the scale of 1:15,840 and flown in 1973, were used to record the geological data which were then transferred to a 1:15,840 base map supplied by the Cartographic Unit of the Surveys and Mapping Branch.

ACKNOWLEDGMENTS

During the 1976 field season K. Chalmers, B. Curtis, and J. Beaver were junior assistants and J. Wittstock was senior assistant. The competence and enthusiasm of J. Wittstock were particularly appreciated by the writer. Most of the air service was provided by the Aviation Service of the Ministry of Natural Resources based in Sault Ste. Marie; the help offered by all the flying and support personnel, and in particular by Mr. G. Beauchene, pilot, is gratefully acknowledged. Thanks are extended to HBOG Mining Limited for sending their helicopter to service one of the writer's fly-camp crews stranded because of bad weather.

[1]Geologist, Precambrian Geology Section, Ontario Geological Survey, Toronto. Approved for publication by the Chief Geologist, June 11, 1981. This report is published with the permission of E. G. Pye, Director, Ontario Geological Survey.

GENERAL GEOLOGY

Western parts of the map-area are underlain by metavolcanics which are part of the western margin of the northeast-trending lobe of supracrustal rocks of the Batchawana belt (Siragusa 1981). Granitic rocks of regional extent underlie most of the map area, and are in contact with the metavolcanics along a roughly parabolic line with an east-trending axis and convex to the west. Minor discontinuous bands of volcanogenic metasediments and ironstone are locally interbedded with the metavolcanics, and relatively large occurrences of interbedded ironstone-chert are found in northern Gapp Township where they form several prominent northwest-trending bands of variable length and width. Lithologic units are listed in Table 1.

TABLE 1. TABLE OF LITHOLOGIC UNITS FOR THE QUINN LAKE AREA.

CENOZOIC
QUATERNARY
PLEISTOCENE AND RECENT*
Boulder, sandy, and silty till; cross-bedded sand deposits, erratic boulders.

Unconformity

PRECAMBRIAN
MIDDLE TO LATE PRECAMBRIAN (PROTEROZOIC)
MAFIC INTRUSIVE ROCKS
Diabase dikes, porphyritic diabase dikes.

Intrusive Contact

EARLY PRECAMBRIAN (ARCHEAN)
FELSIC INTRUSIVE AND MIGMATITIC ROCKS
FELSIC INTRUSIVE ROCKS
Porphyritic quartz monzonite, granodiorite.

MIGMATITE
Dioritic to tonalitic migmatite, subordinate metavolcanic migmatite and lit-par-lit hornblende gneiss.

Intrusive Contact

METASEDIMENTS
CLASTIC METASEDIMENTS
Polymictic conglomerate, conglomeratic arenite, arenite, banded mudstone.

IRON-RICH CHEMICAL METASEDIMENTS
Magnetitic ironstone, magnetitic chert.

METAVOLCANICS
FELSIC METAVOLCANICS
Muscovite schist; foliated to sheared lapillistone and tuff, minor breccia.

MAFIC AND INTERMEDIATE METAVOLCANICS
MAFIC FLOWS
Chlorite schists, foliated pillowed and massive flows, migmatized flows.

PYROCLASTIC (INTERMEDIATE) ROCKS
Chlorite schist containing deformed tuff-size to block-size felsic metavolcanic clasts.

*Not described in present report.

The metavolcanics consist dominantly of metamorphosed basaltic flows with rare felsic metavolcanic interbeds. Subordinate metamorphosed pyroclastic rocks which are thought to be of intermediate composition occur as elongated or lens-like bodies of relatively large size, and tend to parallel the contact of the granite with the metavolcanics in a broadly concentric pattern. The basaltic metavolcanics within the present map-area are part of the middle and lower sections of a northwest-trending and southwest-facing overturned sequence of metavolcanics which underlies most of Way-White Township and parts of Running and Desbiens Townships, and has an estimated maximum thickness of 9900 m (Siragusa 1981). The top section of this sequence is about 2000 m thick, and includes calc-alkaline pyroclastic metavolcanics of rhyolitic composition which underlie areas outside the present map-area (i.e. southwestern Way-White and north-central Desbiens Townships). The middle section of the sequence includes high-iron tholeiitic basalt, and the lower section of the sequence includes tholeiitic basalt of both iron-rich and magnesium-rich trends and lesser basaltic komatiite. All the data used to classify the metavolcanics of the Quinn Lake area are from adjacent areas mapped by the author (Siragusa 1981). The pyroclastic metavolcanics within the present map-area consist of widely variable amounts of ash-size to block-size deformed felsic metavolcanic clasts embedded in a mafic matrix of basaltic appearance. These rocks are essentially restricted to the present map-area, and differ from the felsic pyroclastic metavolcanics at the top of the sequence in which both matrix and clasts have a similar composition.

The granitic rocks consist largely of potassic phases which are commonly massive, porphyritic, and less frequently pegmatitic. Relatively large migmatitic domains occur along the western and southern margins of the granitic pluton underlying the Dyson-Emerson- Point Lakes area. The outlines and discrete distribution of these domains suggest that the growth of the pluton occurred in a balloon-like fashion so that a formerly continuous marginal migmatitic zone was progressively disrupted into the present pattern by addition of uncontaminated granitic magma from the inner parts of the pluton.

Intrusion of Late Precambrian diabase in the form of dikes and irregular bodies is widespread throughout the Batchawana-Quinn Lake area and gives rise to many prominent physiographic features. The main factors that seemingly controlled the emplacement of diabase were regional and dominantly northwest-trending fractures in the granitic and supracrustal rocks, and, to a lesser extent, the path of least resistance along the plane of metamorphic foliation in the metavolcanics.

Early Precambrian (Archean)

METAVOLCANICS

Mafic and Intermediate Metavolcanics

MAFIC FLOWS

Mafic metavolcanics are the dominant volcanic type and consist mostly of schists with a variable fissility. They are green-grey, and weather to grey-tan hues; reddish stains are locally present owing to oxidation of pyrite disseminations. Deformed pillow structures that are of little use for top determinations are not uncommon in the mafic metavolcanics, and overturned southwest-facing pillows occur in the Browne Lake area. Chlorite, carbonates, and plagioclase, generally in the given order of decreasing abundances, are the principal components of these rocks, but the volume of carbonates may exceed that of chlorite particularly in rocks of dominantly grey colour. Chlorite occurs as scaly, lamellar, and fan-shaped aggregates of relatively large size, and also as aggregates with carbonates as a component of the cloudy cryptocrystalline ground-mass of the rock. Carbonates are ubiquitous as a groundmass component, fracture-filling material, and replacement products of plagioclase. Plagioclase occurs as anhedral laths which are commonly 0.08 to 0.2 mm in size, and although they may retain their original outlines are in most cases thoroughly altered by carbonatization and kaolinitization. Quartz, epidote, hematite, leucoxene, and pyrite are common accessory minerals, whereas biotite, muscovite, actinolite, zircon, and pyroxene relics are less common.

The rocks just described are part of the middle and lower sections of a dominantly basaltic metavolcanic sequence which trends northwest, faces southwest, is overturned, and underlies large portions of the area adjacent to, and to the west of the present map-area (Siragusa 1981). The middle section of the sequence may be approximately defined as the area between the southwest corner of the present map-area, and a northwest-trending line which intersects the southern boundary of the present map-area at the longitude of Watson Lake (Gapp Township). The lower section of the sequence includes the metavolcanics northeast of this line. Chemical analyses of samples from Way-White Township indicate that the metavolcanics in the middle section of the stratigraphy are largely high-iron tholeiitic basalt (Siragusa 1981 plots 24, 28, 30, 31, 32, 33), and that those in the lower section of the stratigraphy include dominant tholeiitic basalt of both iron-rich and magnesium-rich trends, and lesser basaltic komatiite (plots 5, 6; 4, 7, 15; 18, 19 respectively). The basaltic metavolcanics contain rare felsic interbeds which are generally a few metres or less in thickness, locally show fairly sharp contact relationships (Photo 1), and are tuffaceous (Photo 2). Because of their thinness these interbeds are difficult to trace over significant distances, and the inferred lengths of these units shown on the map are based largely on interpretation.

Photo 1. *Felsic interbed in mafic metavolcanics, showning sharp contact relationships. Wlasy Township.*

Photo 2. *Detail of outcrop in Photo 1, showing tuffaceous texture of felsic interbed.*

PYROCLASTIC (INTERMEDIATE) ROCKS

Intermediate metavolcanics consist of deformed rhyolitic clasts embedded in a matrix which in the field and in thin section is essentially indistinguishable from basalt. The clasts have elongated or lens-like cross sections with axial ratios that are commonly 1/3 to 1/9, and the long axes of which vary in length from a few millimetres to about 2 m. The relative abundance of clasts of different size-classes within this dimensional range, may vary considerably in closely spaced outcrops, and also within the same outcrop. The ratio of the total volume of clasts, regardless of size, to the volume of matrix is also quite variable between the minimum and maximum values of about 10 and 80 percent. A study of the chemistry of these rocks would require analyses of many samples of matrix and clasts from each outcrop, and this is beyond the scope of the present work. The intermediate metavolcanics are most easily recognized where most, or some, of the clasts are large. In rocks metamorphosed under greenschist facies conditions the clasts have a characteristic streamlined shape (Photo 3), and where amphibolite facies conditions of metamorphism were attained the outlines of the clasts are to some extent emphasized by the darker colour of the recrystallized hornblende-rich matrix (Photo 4). Where the clasts are small and few in number these rocks can be difficult to recognize, particularly if shearing has occurred. In fact, in these conditions, the rock is usually a strongly foliated chlorite schist which may be easily mistaken for a basaltic flow of low metamorphic grade. The direction, if any, along which the size and/or frequency of the clasts may increase, is unknown because of scarcity of outcrops of intermediate metavolcanics and the wide variations in size and distribution of clasts. The only generalizations which can be made are that these rocks form a broadly concentric pattern around the western margin of the granitic pluton underlying Wlasy Township, and that the largest clasts occur in an outcrop east of Vacher Lake (see Photo 3).

Felsic Metavolcanics

Felsic metavolcanics include minor felsic interbeds of rhyolitic to dacitic composition which are rarely found within the basaltic and the intermediate metavolcanics. The size and contact relationships of these interbeds were described above. The weathered surfaces of relatively unmetamorphosed felsic interbeds are textured by fragments that are generally 1 to 3 mm in size, are lighter in colour than the matrix (see Photo 2), and are indistinguishable from the matrix on the fresh cut. The fragments consist of altered plagioclase phenocrysts, and of small quartzofeldspathic aggregates interpreted as lithic fragments, and are embedded in a microcrystalline quartzofeldspathic groundmass containing accessory amounts of muscovite, chlorite, carbonates, epidote, iron oxides, and pyrite. The outlines of the fragments are nearly equant, ovoid, or lens-like depending upon the intensity of deformation undergone by the rock. The felsic interbeds are commonly sheared to some extent, and where severe shearing has occurred the rock has been

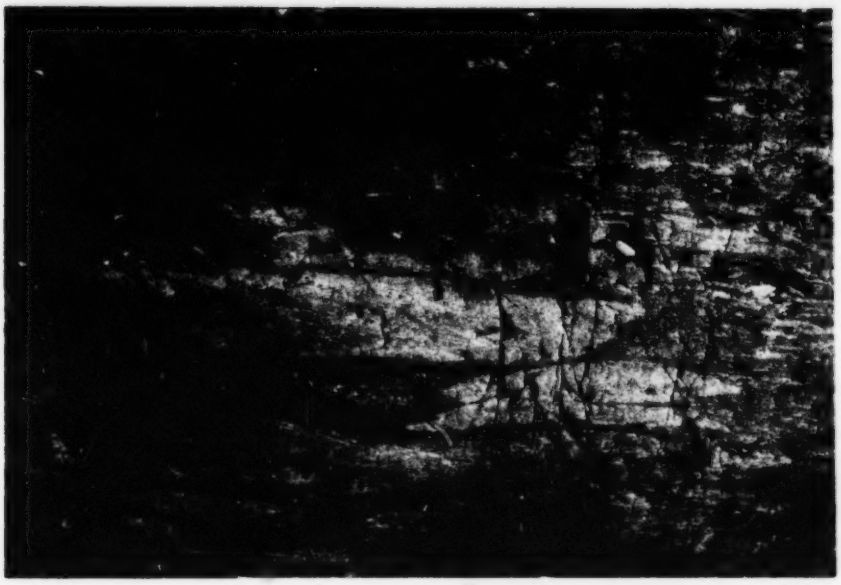

Photo 3. *Intermediate pyroclastic metavolcanics of relatively low metamorphic grade in the Vacher Lake area.*

Photo 4. *Intermediate pyroclastic metavolcanics of relatively high metamorphic grade in the Vacher Lake area.*

reduced to a muscovite schist in which hundreds of paper-thin laminae may be packed in a thickness of about 2 cm. Lens-like domains characterized by slight differences in texture and/or colour hues were noted in the felsic interbeds, and on the basis of the size of these domains the interbeds were interpreted mostly as sheared lapillistone and tuff, and rarely as sheared felsic breccia.

METASEDIMENTS

Clastic Metasediments

The metasediments include minor metamorphosed polymictic conglomerate, conglomeratic arenite, arenite, and banded mudstone, found interbedded within metavolcanics at a few localities. The largest of these occurrences is a lens-like body of banded mudstone with an estimated maximum length and thickness of 1,500 and 270 m, respectively, within intermediate metavolcanics in northern Gapp Township. Arenite has a tan or greyish-tan weathered surface which may show a fine granular texture. The fresh cuts generally have a homogeneous dense texture, and slightly darker colour than the weathered surfaces. The rock consists of feldspars and quartz grains which are 0.005 to 0.8 mm in size, are present in estimated proportions of 70 and 75 percent in volume, respectively, and are mostly fresh-looking owing to recrystallization. The feldspars appear to be dominantly alkalic in composition (i.e. potassic feldspar and albitic plagioclase). An estimated 6 percent in volume of the rock consists of feldspar, quartz, and rock fragments that are 1 to 3 mm in size. Minor chlorite, muscovite, and opaques are the accessory minerals. Conglomeratic arenite and conglomerate consist of arenite containing ovoid clasts 2 cm to about 20 cm in size, which are present in estimated volumes of up to 10 and 35 percent, respectively. The clasts consist dominantly of felsic metavolcanics, and subordinate chert and wacke. Banded mudstone consists of light-coloured epiclastic siltstone (i.e. fragments in the range 0.004 to 0.06 mm), interlaminated with darker coloured mudstone. Both the light and dark coloured laminae contain variable amounts of chert. The concentration of chlorite varies considerably between individual laminae and is essentially responsible for the colour differences. This feature distinguishes the rock from ironstone-bearing mudstone, because in the latter, the colour differences of the bands reflect the laminar distribution of iron oxides, notably magnetite.

Iron-Rich Chemical Metasediments

Deposits of ironstone are found primarily in the Boyle-Butter Tin Lakes area of southern Wlasy and northern Gapp Townships. In this area magnetite ironstone occurs as dominantly northwest-trending laminae or beds which are interlayered with chert and magnetitic chert, and locally with banded cherty mudstone. Interlayering is generally well defined although in some outcrops it may be concealed by reddish-brown staining of the weathered surfaces. The criterion used in defining the thickness of the generalized iron formation bands shown on the map, is that the total estimated thickness of magnetite ironstone plus magnetitic chert, exceeds the total thickness of chert and cherty mudstone (banded mudstone map-unit) interbedded with them. This empirical criterion is necessary because the individual beds of ironstone proper are much too thin and too numerous to be shown at the present scale. However, the criterion implies that for each band the cumulative thickness of economically significant iron mineralization may be half, or less than half, the thickness shown on the map. The lengths of the bands were inferred from outcrops along strike, magnetic attraction in areas covered by overburden, and assessment work information. The bands locally show convolute bedding characteristic of the magnetite-chert sequences in the Batchawana-Quinn Lake general area, but as a whole they form a rather regular northwest-trending array which parallels the granite-metavolcanic contact. The largest of these bands is the one with the bifurcated eastern end just north of Butter Tin Lake (Gapp Township); it has a maximum width of about 140 m and is 2,800 m long.

In northern Wlasy Township, a 120 m thick northwest-trending iron formation unit of magnetite ironstone interlayered with red jasper is partially exposed along the southern shore of Vacher Lake. The maximum estimated length of this unit is 1,200 m. Apart from the localities mentioned above, minor occurrences of magnetite ironstone and/or magnetitic chert were found in the Snyder Lake, Irene Lake, Dixon Lake, and Dismal Lake areas, and in a few other localities. All these occurrences are too small and scattered to be of economic significance for iron.

The hosts of all the magnetite ironstone occurrences in the map-area are the metavolcanics in the lower section of the northwest-trending sequence. These include metamorphosed basaltic flows, and pyroclastic metavolcanics of intermediate composition. Neither of these, however, appears to be a preferential host of ironstone which is found within both types, and in some cases transgresses their contact.

FELSIC INTRUSIVE AND MIGMATITIC ROCKS

Felsic Intrusive Rocks

The granitic rocks of the map-area are dominantly massive potassium-rich felsic intrusions and subordinate migmatite.

The potassic types have potassium feldspar to total feldspar ratios which were visually estimated to be mostly within the quartz monzonite compositional range (i.e. 0.66 - 0.33), or within the potassium-rich portion of the granodiorite range (i.e. 0.33 - 0.25). These are massive pink to reddish rocks which are commonly porphyritic and locally pegmatitic, may be epidotized along the numerous intersecting joints affecting them, contain quartz and biotite in estimated volumes of 20 to 35 and 2 to 6 percent, respectively, and have a groundmass grain-size of 2.5 to 5 mm. Rarely the rocks are brick-red in colour.

Porphyritic varieties contain potassium feldspar and/or quartz phenocrysts that are generally 10 to 40 mm in size. The potassium feldspar is commonly microcline, generally perthitic, and contains minute poikilitic inclusions of plagioclase, quartz, and biotite. Plagioclase consists of oligoclase (An_{14-27}) and albite (An_{3-7}), and is generally affected to variable extent by kaolinization except for the albitic rims surrounding the poikilitic inclusions of plagioclase in microcline (Siragusa 1981). Microcline has crystallized last as indicated by the fresh appearance of this mineral compared to the widespread alteration of plagioclase. Quartz is commonly interstitial to the feldspar crystals although it can be present as prominent subhedral crystals in the porphyritic types. Regardless of its mode of occurrence quartz shows pronounced undulatory extintion. One or more of biotite, chlorite, sericite (as alteration product of feldspars), epidote, pyrite, magnetite, hematite and zircon (in biotite) are the common accessory minerals. Biotite is dominant and occurs mostly as well defined strongly dichroic tabular crystals which may show a little chloritic alteration, and which contain minute segregations of iron oxides. Muscovite, penninite, carbonates, hornblende relics, and apatite are rare accessory minerals.

Migmatite

The migmatitic rocks include types which are compositionally and texturally different depending upon the proportions of paleosome and granitic neosome that are present, and the composition, shape, size, mutual relationships, and degree of assimilation of the paleosome components. As used by the author migmatite is a mixed rock in which fragments (or xenoliths) of old country rock (paleosome) are embedded in a younger rock (neosome) of intrusive or metamorphic origin. Metavolcanic migmatite in which the paleosome is almost exclusively basaltic is the most common, and metasedimentary migmatite and migmatite with ironstone or magnetite chert as paleosome components, are relatively rare. The textural range of metavolcanic migmatite varies between two general types which, for purpose of simplification, may be described as a "dioritic" type and an agmatitic type. The first type includes essentially structureless granitic rocks which have trondhjemitic composition (i.e. low potassium feldspar content), and have a combined biotite-hornblende content which may exceed 25 percent in volume. These rocks have resulted from complete or nearly complete assimilation of basalt, and are generally found as small individual outcrops, and as texturally homogeneous local domains within outcrops of heterogeneous migmatite. The agmatitic type contains xenoliths of variably recrystallized basalt which may vary in size from a few centimetres (Photo 5) to several tens of centimetres (Photo 6), and which have generally well defined angular outlines. These migmatitic rocks are obviously characterized by a relatively low degree of assimilation, but the inference of the conditions under which little assimilation prevails is not a simple matter. For example considering the migmatite shown in Photo 7, one can see that essentially

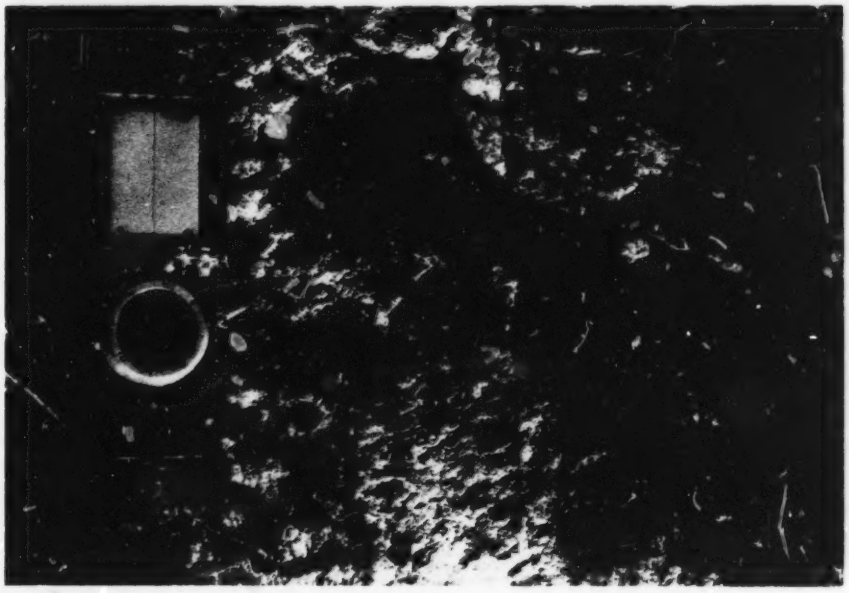

Photo 5. *Agmatitic migmatite containing small xenoliths of metabasalt. Bracci Township.*

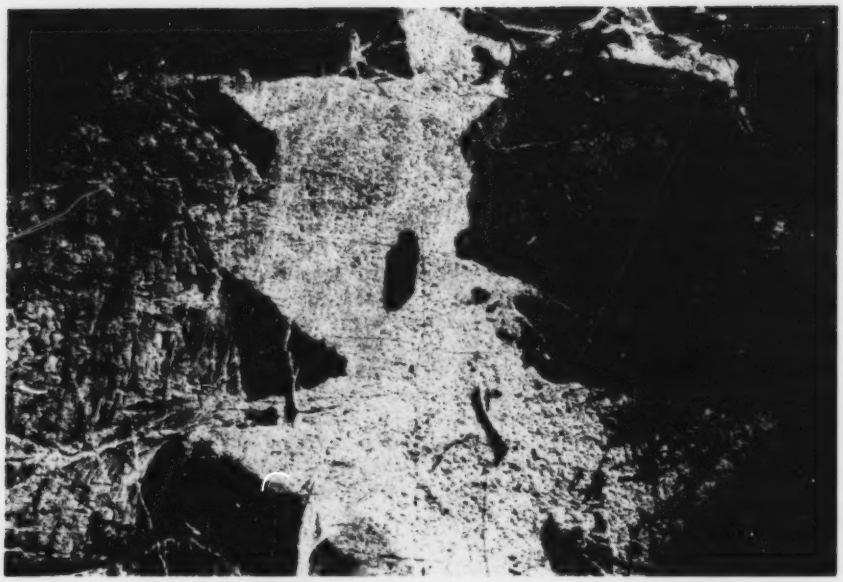

Photo 6. *Agmatitic migmatite containing blocks of metabasalt. Bracci Township.*

Photo 7. *Agmatitic migmatite containing small xenoliths of metabasalt, a few of which are slightly assimilated. The lower portion of the outcrop (bottom of photo) is unexposed, but it appears that the agmatitic domain gives place to the characteristic features of lit-par-lit gneiss. Bracci Township.*

angular and well defined xenoliths such as those in the upper right corner of the photograph, may occur together with streamlined and partially assimilated xenoliths (close to the lower edge of the photograph) within the same small domain of an outcrop. This indicates that selective assimilation of xenoliths of suitable metamorphic state, or differential laminar flow of the neosome, or a combination of these factors, must be dealt with even if relatively simple agmatitic textures are to be explained. Among the several types within the migmatitic textural range defined above, lit-par-lit gneiss is perhaps the most common. This type generally consists of discontinuous (i.e. lens-like or disrupted) subparallel xenoliths of recrystallized basalt interlayered with trondhjemitic neosome. These xenoliths, which may consist almost exclusively of hornblende, show in most cases little or no evidence of assimilation, and may be locally characterized by highly contorted outlines.

In order to show on the map the contacts of the migmatitic domains with the regional granitic rocks, the textural and compositional variations within the set of the migmatitic rocks have been ignored. The empirical distinguishing criterion adopted is therefore the evidence of contamination of the regional granitic rocks, regardless of its extent and local features. It follows that an area shown as migmatitic on the map may include quartz monzonite containing a few scattered xenoliths of small size, and/or large occurrences of migmatite of variable textural character and composition.

Middle to Late Precambrian (Proterozoic)

MAFIC INTRUSIVE ROCKS

Diabase dikes, dominantly northwest-trending, are a prominent feature throughout the Batchawana-Quinn Lake area, and are even more numerous than could be shown on the map. Foliation in the metavolcanics, and northwest-trending regional fractures in all the Early Precambrian rocks, are apparently the main factors which controlled the emplacement of diabase. The thickness of the dikes varies from about 0.5 m in thin dikelets, to about 120 m measured in a dike exposed over a length of 275 m in Desbiens Township. Occurrences of variably strained supracrustal rocks 'sandwiched' between closely spaced diabase dikes are not uncommon in the Batchawana-Quinn Lake area; because of this, clusters of diabase outcrops showing no clear evidence of a preferred trend were generally interpreted as areas underlain by two or more parallel or converging dikes, rather than by a unique wide dike. Some of these clusters, however, are interpreted as isolated small intrusions of local character (e.g. Dismal Lake area, Way-White Township). The dikes have fine-grained to glassy chill margins, commonly contain pyrite disseminations, and may be locally porphyritic owing to the presence of altered plagioclase phenocrysts up to 6 cm in size.

Diabase is a massive and essentially fresh-looking rock of grey-green to dark green colour, and a grain-size of commonly 1 to 8 mm. The rock weathers to a uniform or mottled brown colour which typically penetrates the rock for only a few millimetres. A red-brown weathered surface is characteristic, although not necessarily diagnostic, of olivine-bearing diabase. Diabase consists primarily of labradorite (An_{51-56}) and augite which are present in estimated volumes of 40 to 60 percent, and 15 to 30 percent, respectively. Labradorite occurs as essentially unaltered randomly oriented euhedral laths which normally show excellent polysynthetic twinning. Augite is mostly present as short crystals of prismatic habit which are smaller than, and interstitial to the labradorite crystals. Also, augite may show a poikilitic texture owing to inclusions of labradorite, ilmenite, and biotite. One or more of biotite, ilmenite, chlorite, leucoxene, pyrite, hematite, and quartz are the common accessory minerals. Ilmenite may account for an estimated volume of up to 8 percent, and is commonly found in the form of skeletal crystals associated with leucoxene. Olivine, serpentine, and hornblende (pseudomorphic after augite), are uncommon accessory minerals.

STRUCTURAL GEOLOGY AND GEOLOGIC HISTORY

Way-White Township and parts of the adjacent townships in the eastern half of the Batchawana area, are underlain by a dominantly basaltic metavolcanic sequence which trends northwest, faces southwest, and is overturned. The upper section of the sequence consists of calc-alkaline felsic metavolcanics exposed outside the present map-area (Siragusa 1976). The metavolcanics in the Quinn Lake area include parts of the middle and lower sections of this sequence and, accordingly, they are characterized by a general northwest trend; the structural relationships present in the few outcrops where top determinations were possible, indicate that the portion of the series within the present map-area is also at least partially overturned and faces southwest. The metavolcanics in the northern part of the Quinn Lake area were deflected from their original northwest trend by deformation which was associated with the emplacement of granitic rocks. This deflection is emphasized by the broadly concentric discontinuous pattern of the intermediate pyroclastic units around the metavolcanic-batholithic contact in the western half of the area.

The main structure of the area appears to be the northwest-trending subvertical to overturned homoclinal sequence, the lower section of which consists of intermediate pyroclastic phases of limited lateral extent, intercalated with more abundant effusive basaltic phases. Deposition of iron, chert, and/or cherty mudstone occurred primarily during quiescent intervals of relatively late pyroclastic and effusive volcanism, and resulted in the magnetite ironstone deposits presently found in the Butter Tin-Boyle Lakes area. The smaller ironstone occurrences in the Vacher Lake area are conversely associated with earlier volcanism which produced the rocks at the bottom section of the sequence. The largest clasts in the intermediate metavolcanics were found east of Vacher Lake, and this suggests that volcanic vents may have existed in northern parts of the map-area presently underlain by granitic rocks. Deformation of the volcanic rocks domi-

nantly along the northwest trend and subordinately along ENE trends in northern parts of the area, was accompanied by metamorphism which is essentially upper greenschist facies (Fyfe *et al.* 1958). Contact metamorphism resulted in migmatitic zones marginal to the granitic pluton underlying the Dyson-Emerson-Point Lakes area. The largest of these zones has a general northeast trend, maximum width of about 1,700 m, and is 10 km long. This zone is thought to be the largest remnant of a formerly continuous migmatitic fringe extending from this area to Gaudry Township.

ECONOMIC GEOLOGY

Mineral Exploration*

With the exception of a group of 18 claims located across the central segment of the southern boundary of the present map-area, all the areas where recorded exploration has occurred are within the supracrustal rocks underlying the western half of the map-area; the group of 18 claims was covered by ground magnetic and electromagnetic surveys carried out, presumably in 1968, by Humbleford Exploration Limited. In 1956 considerable exploration work was carried out by the Five Townships Syndicate in parts of Way-White Township adjacent to, and to the west of the Quinn Lake area (Siragusa 1981).

The Browne–Butter Tin–Dyson Lakes area of northern Gapp and southern Wlasy Townships has recurrently attracted exploration which has included (1) dip needle surveys by Mining Research Corporation Limited over a group of 46 claims, and by Mekatina Iron Mines Incorporated over a group of 27 claims, in 1944 and 1950, respectively, and (2) dip needle surveys and geological mapping of 6 claims, geological mapping of 15 claims, drilling of 12 diamond drill holes for a total of 776 m, and geological mapping of 3 claims, carried out by the Exploration Division of Algoma Steel Corporation Limited in 1953, 1959, 1965, and 1966, respectively.

Northwestern Wlasy Township and southeastern Running Townships have attracted some exploration activity in recent years. Presumably before 1960, Modern Geophysical Limited completed a ground magnetometer survey on a group of 10 claims in the Vacher Lake area of Wlasy Township. This work was done on behalf of Windy Hill Mining Corporation Limited and in 1960 five diamond drill holes for a total of 459 m were completed in the Vacher Lake area by Principle Strategic Minerals Limited. In early 1974 Asarco Exploration Company of Canada Limited entered a joint venture agreement with Algoma Central Railway with respect to the mineral rights of Running Township, and during May of the same year electromagnetic and magnetic surveys were flown by Kenting Earth Sciences Limited. Geological and geophysical ground follow-up of this work was carried out by Asarco Exploration Company of Canada Limited in June and August of the same year.

Except for the large metavolcanic xenoliths within the granitic rocks underlying northeastern Wlasy Township, all the metavolcanics within the present map-area and those in parts of adjacent areas were covered by a major helicopter-supported exploration program carried out in 1976 by HBOG Mining Limited. This program included airborne electromagnetic and magnetic surveys followed by detailed geological and geophysical ground investigations; blasting, trenching, and drilling were also carried out by HBOG Mining Limited to test electromagnetic conductors at several localities in the general area. Drilling included 15 diamond drill holes for a total of 719 m none of which is within the present map-area. This was a thorough exploration effort which, however, did not locate any economically significant base metal mineralization (HBOG Mining Limited, personal communication).

Ownership Status

As of April 17, 1979 the following conditions obtained.

(1) Running and Desbiens Townships are owned by Algoma Central Railway (ACR), and are not open for staking under the Ontario Mining Act. Persons interested in mineral exploration in these townships are referred to the Division of Lands and Forests of ACR, Sault Ste. Marie, Ontario.

(2) Two groups of claims in good standing cover the ironstone deposits in northern Gapp Township. The westernmost group includes 15 contiguous surveyed claims numbered SSM 63734 to 63743 (inclusive); SSM 63746, SSM 63747, and SSM 63749 to 63751 (inclusive), and is the property of the Algoma Steel Corporation Limited. The easternmost claim group includes 14 contiguous surveyed claims numbered SSM 13969 to 13977 (inclusive), SSM 14000 to 14004 (inclusive), and is the property of Claude W. Coates of Sault Ste. Marie.

(3) All the lands which are within the map-area and are other than those mentioned above, were open for staking as of April 17, 1979.

Mineralization

Iron in magnetite ironstone is the only metal found to date in economically significant concentrations in the map-area. Minor occurrences of fine-grained pyrite and pyrrhotite as disseminations or thin stringers are locally associated with ironstone and magnetitic chert, but no copper, zinc, or lead sulphides were noted in the iron sulphides. Assay data of ironstone samples from 11 bands in northern Gapp and southern Wlasy Townships, are shown in Table 2. The samples were collected during the present mapping and were assayed by the Geoscience Laboratories, Ontario Geological Survey; each sample consisted of several chips of magnetite and magnetitic chert from the same band, and most samples contained pyrite and/or pyrrhotite disseminations.

*Except where otherwise stated, information was obtained from Assessment Files Research Office, Ontario Geological Survey, Toronto.

TABLE 2. ASSAYS OF IRONSTONE BANDS FROM NORTHERN GAPP AND SOUTHERN WLASY TOWNSHIPS.

Specimen	Cu%	Pb%	Zn%	Fe%	Cr%	Ti%
4.29.D2	Tr	Tr	Tr	29.9	0.02	Tr
4.29.D3	Tr	Tr	Tr	38.0	0.02	Tr
4.30.2	Tr	N	N	37.5	0.01	Tr
4.30.5	Tr	N	N	33.8	0.01	Tr
5.30.A1	0.01	N	Tr	35.5	0.02	Tr
5.30.A2	Tr	N	Tr	33.7	0.02	Tr
5.31.B1	Tr	Tr	Tr	24.1	0.03	0.02
5.31.B2	Tr	Tr	Tr	35.9	0.02	Tr
5.31.B3	Tr	Tr	Tr	36.6	0.02	Tr
5.31.2	Tr	N	N	32.3	0.01	0.02
5.31.3	Tr	N	N	32.1	0.01	Tr

Notes:
Tr = trace.
N = none detected.
Assays by Geoscience Laboratories, Ontario Geological Survey, Toronto.

The analyses show that the bands are good low-titanium iron ore; a partial estimate of tonnage was given in 1951 by Mekatina Iron Mines Incorporated (see "Mineral Exploration", above) as follows: "It is estimated that the broad area south and west of Maude Lake* in claim 15705 and on the margins of adjoining ones is a potential orebody 800' x 1,100' which could average 10 million tons per 100 feet of depth. The other bands of iron formation, where exposed, indicate a workable grade over as much as 270' in width and this would make the whole property a potential producer of at least 50 million tons per 100 feet. There is a possibility of three times as much" (File No 63/263, Mekatina Iron Mines, Assessment Files Research Office, Ontario Geological Survey, Toronto).

Shklanka (1968, p.44) summarized the drilling data on magnetite and magnetitic red jasper ironstone occurrences along the southern shore of Vacher Lake (northern Wlasy Township), (Principle Strategic Minerals Limited) as follows: "drilling on the S end of Vacher Lake on two lenses 400 and 900 feet long, intersected from 7 to 89 feet (core lengths) of iron formation. In one hole 33 feet averaged 38.84% Fe, 0.23% Mn, 0.57% S, and 0.034% P; in another, 89 feet averaged 26.4% Fe, 0.14% Mn, 0.065% P, 43.4% SiO_2, 0.30% S".

Both the limited field evidence available and the information from the assessment records, suggest that the Vacher Lake ironstone occurrences are much smaller and more localized than those in the Butter Tin-Boyle Lakes area.

The exploration programs carried out by Asarco Exploration Company of Canada Limited in 1974, and by HBOG Mining Limited in 1976 (see "Mineral Exploration", above), were aimed at locating massive base metal sulphide mineralization. Nothing of economic interest was found by Asarco, and it was recommended that no further work be carried out on the property at that time. The HBOG program included all the metavolcanics in the map-area, and also failed to locate economically significant base metals mineralization.

*Maude Lake is the local name of the small, elongated, northwest-trending lake located between the southern tip of Quinn Lake, and the northern tip of Butter Tin Lake.

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Siragusa G.
1976a: Quinn Lake Area (West Half); Ontario Geological Survey, Preliminary Map P. 1833, scale 1:15,840.
1976b: Quinn Lake Area (East Half); Ontario Geological Survey, Preliminary Map P. 1834, scale 1:15,840.
1981: Geology of the Batchawana-Pangis Area, District of Algoma; Ontario Geological Survey, Open File 5345, 119 p.

MARGINAL NOTES

LOCATION AND ACCESS

The present map-area includes an area bounded by Latitudes 47°07′30″N and 47°15′N, and Longitudes 83°45′W and 84°00′W. This area is comprised of the southern portions of Schembri and Scriven Townships, the northern portions of Gapp and Gaudry Townships, the northeastern corner of Desbiens Township, the southeastern corner of Running Township, the eastern portion of Way-White Township, the western portion of Bracci Township, and all of Wlasy Township.

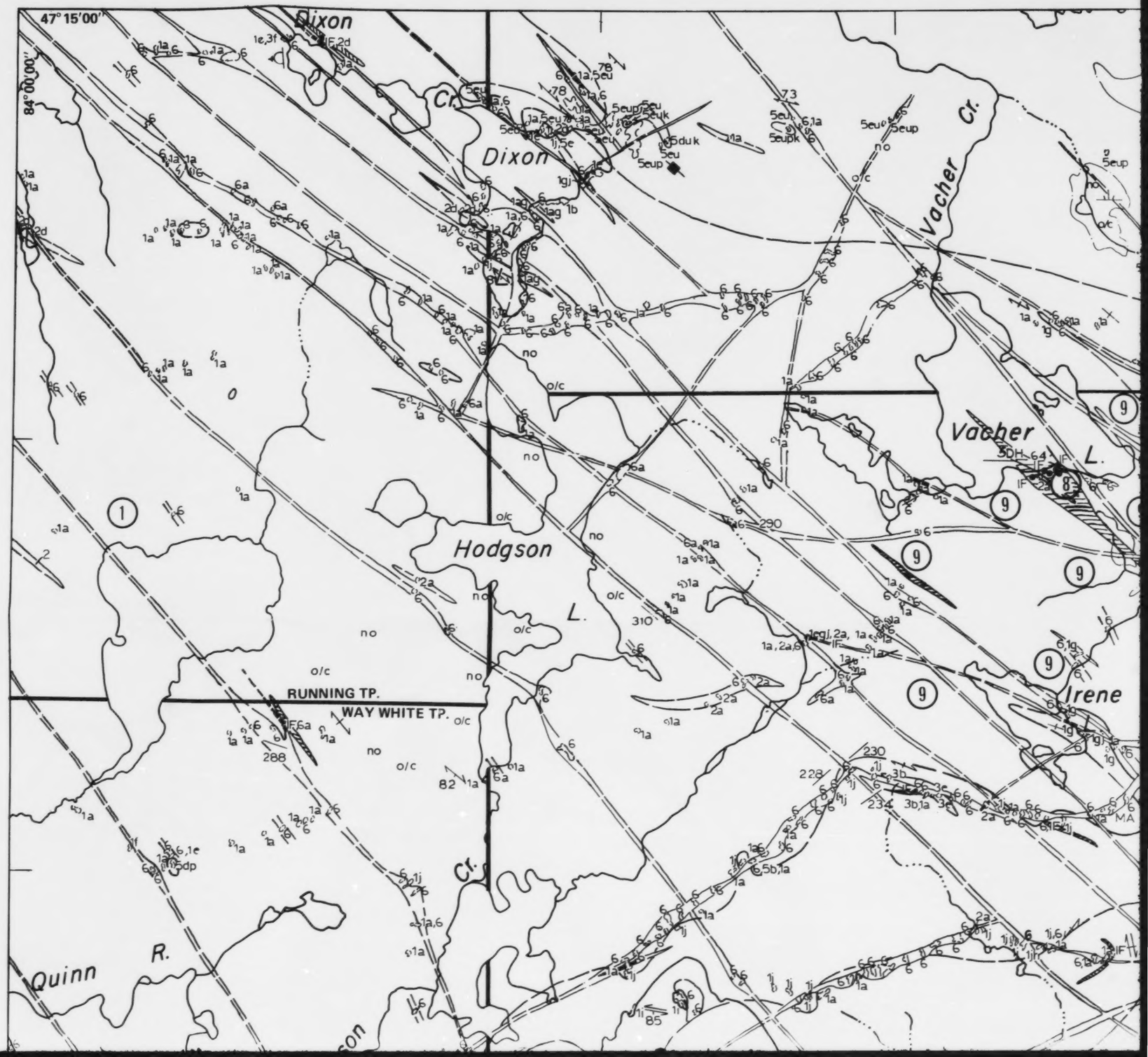
The centre of the map-area is 80 km north-northeast of Sault Ste. Marie. A bush road approximately 58 km long connects the southern tip of Quinn Lake (in northern Gapp Township) with the village of Searchmont, and thence with Heyden via Highway 556, and Sault Ste. Marie via Highway 17; the distance of Quinn Lake from Sault Ste. Marie via Searchmont and Heyden is about 104 km. Another bush road, which is a recent extension of the Tribag Mine Road, provides limited access to the western side of the St. Clair Lake area in southwestern Running Township, at the very northwestern corner of the map-areaThis road is approximately 72 km long and connects with Highway 17 at Batchawana Bay 64 km north of Sault Ste. Marie. Winter lumber roads intersect parts of the map-area but owing to their poor conditions they do not offer practical means of communications within the area. About 140 lakes are scattered throughout the map-area. Of these, Quinn, Little Quinn, Hodgson, Browne, Snyder, and Dyson Lakes provide access to the central third of the map-area by float-equipped fixed wing aircraft; Emerson Lake, North Chubb Lake, and the largest lake at the boundary of Bracci and Gaudry Townships provide access to the eastern third of the map-area. Virtually all the lakes in the western third of the map-area are unaccessible by fixed wing aircraft, being either too small, or too shallow as, for instance, Dismal Lake. Consequently the only practical means of access to the western part of the map-area, is by helicopter; helicopter service is available in Sault Ste. Marie. The drainage system of the area includes many streams the majority of which are useless as canoe routes, because of the shallowness of the water during most of the summer and frequency of log jams and beaver dams.

Ontario Department of Mines Geological Map 34d (Moore 1927) and the Batchwana-Hubert sheet of the Algoma Central Railway geological map (Algoma Central Railway 1964) cover the western half of the map-area at the scale of 1 inch to 1 mile (1:63 360).

GENERAL GEOLOGY

The western half of the map-area is underlain by metavolcanics which are part of an Early Precambrian metavolcanic-metasedimentary belt extending beyond the northern, southern, and western boundaries of the area. The metavolcanics within the map-area form a northwest-trending sequence with a thickness of approximately 9900 m; metamorphosed basaltic flows interbedded with subordinate agglomeratic and tuffaceous dacitic units and lesser felsic metavolcanic units account for about 7800 m, or slightly over three quarters of the width of the sequence. This dominantly mafic series underlies the portion of Running Township within the map-area, part of southern Schembri Township, most of Way-White Township, the northeastern corner of Desbiens Township, all but the northeastern corner of the portion of Gapp Township within the map-area, and the southwestern, western, and northwestern parts of Wlasy Township. The metavolcanics of the mafic series differ from the mafic metavolcanics of the Batchawana-Pangis area (Siragusa 1975) in that they are generally lighter in colour and grey rather than green in hue. It is suggested that these differences reflect variations in iron content rather than significant difference in silica content. A felsic series consisting of sheared tuffaceous and agglomeratic metavolcanics essentially of rhyolitic composition accounts for the remaining 2000 m of the sequence. These rocks underlie the central part of northern Desbiens Township, and parts of southern, southwestern, and western Way-White Township.

Pillowed flows occur within the mafic series but owing to the deformed state of these structures and, to a lesser extent, to unfavourable geometric relationships in some of the relatively undeformed outcrops, no top determinations could be made in most of the observed occurrences. Southwest-facing pillows, plunging northeast at steep angles, thus indicating moderate overturning of the metavolcanic rocks, were noted at a few localities. The felsic series is thought to stratigraphically overlie the mafic series and the mafic metavolcanics of southwestern Wlasy Township are regarded as the basal section of the portion of the volcanic sequence within the map-area. Bands of oxide-facies iron formation which are particularly conspicuous in the Butter Tin-Boyle Lakes area of Gapp and Wlasy Townships, and in the Vacher Lake area of Wlasy

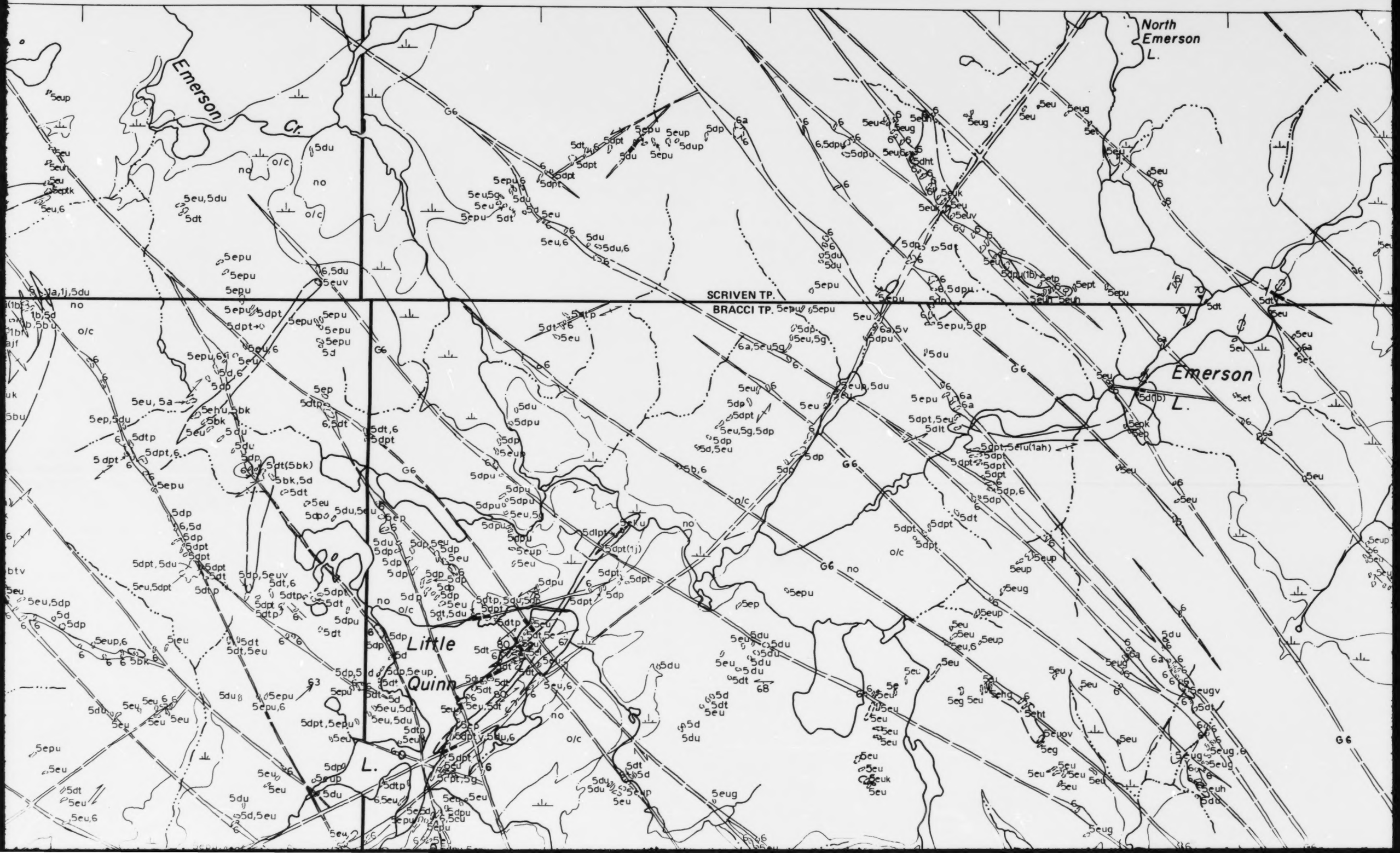


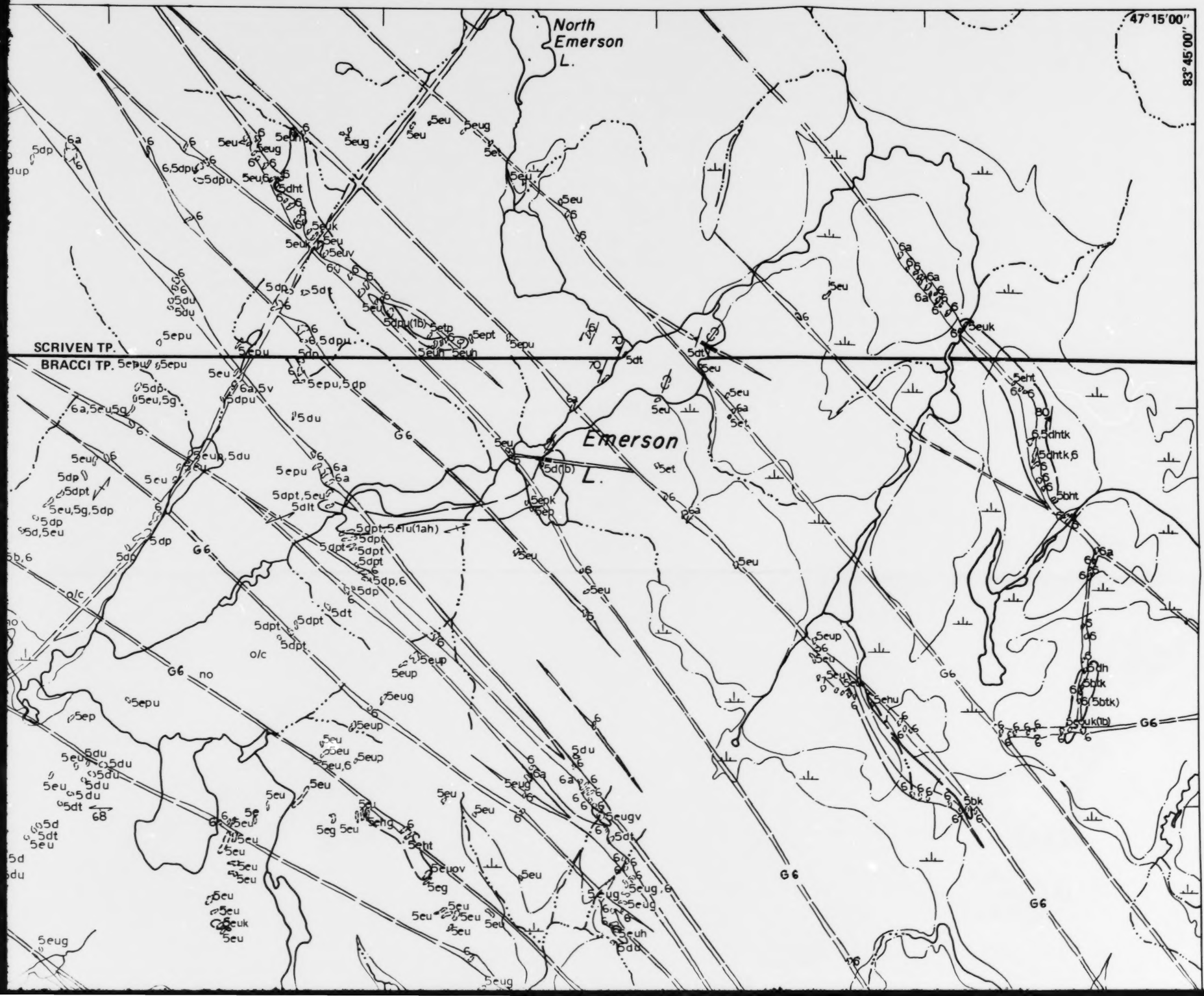
SCHEMBRI TP.

WLASY TP.

Emerson Cr.

Little Quinn L.


Emerson Cr.
North Emerson L.
Emerson L.
Little Quinn L.
SCRIVEN TP.
BRACCI TP.


North
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47°15'00"
83°45'00"
SCRIVEN TP.
BRACCI TP.
Emerson
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5eu
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5dpu
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5dt
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5eup
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5eugv
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5eu,6
5eu,5g
5eu,5du
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in iron content rather than significant difference in silica content. A felsic series consisting of sheared tuffaceous and agglomeratic metavolcanics essentially of rhyolitic composition accounts for the remaining 2000 m of the sequence. These rocks underlie the central part of northern Desbiens Township, and parts of southern, southwestern, and western Way-White Township.

Pillowed flows occur within the mafic series but owing to the deformed state of these structures and, to a lesser extent, to unfavourable geometric relationships in some of the relatively undeformed outcrops, no top determinations could be made in most of the observed occurrences. Southwest-facing pillows, plunging northeast at steep angles, thus indicating moderate overturning of the metavolcanic rocks, were noted at a few localities. The felsic series is thought to stratigraphically overlie the mafic series and the mafic metavolcanics of southwestern Wlasy Township are regarded as the basal section of the portion of the volcanic sequence within the map-area. Bands of oxide-facies iron formation which are particularly conspicuous in the Butter Tin-Boyle Lakes area of Gapp and Wlasy Townships, and in the Vacher Lake area of Wlasy Township, are interbedded with the mafic metavolcanics in the basal section of the sequence. The iron formation occurs close, or adjacent to, the contact of the metavolcanics with the granitic rocks. The outline of this contact is best described as a parabola with an east-trending axis, concavity toward the east, vertex in west-central Wlasy Township, and intersecting the northern and southern boundaries of this township at about their middle points. The granitic rocks underlying the map-area east of this curve at largely uniform, and to a much lesser extent migmatitic.

The metavolcanic and the granitic rocks are cut by dominantly northwest-trending diabase dikes which typically occur as topographic ridges. Two types of diabase are present, one of which is light grey and the other generally dark green. The diabase dikes are much more numerous than shown on the map, and only some of the diabase outcrops have been interpreted on the map at the present time.

MINERAL EXPLORATION

The following information is from the Assessment Files Research Office, Ontario Geological Survey, Toronto, except for information relevant to work done in 1976.

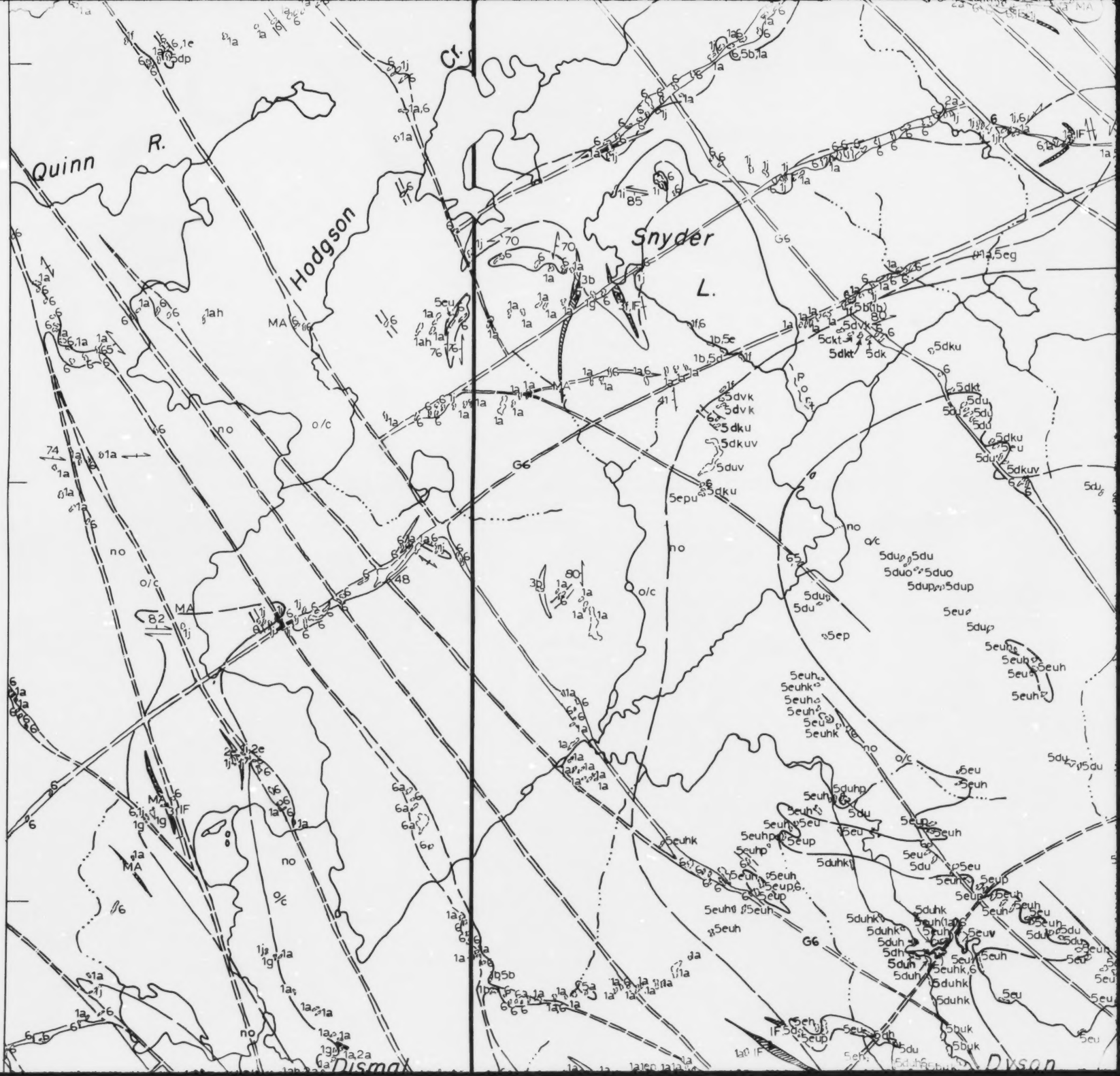
With the exception of a group of 18 claims located across the central segment of the southern boundary of the map-area, all the areas where recorded exploration has occurred are within the supracrustal rocks underlying the western half of the map-area; the group of 18 claims was covered by ground magnetic and electromagnetic surveys carried out, presumably before 1968, by Humbleford Exploration Limited.

The Browne-Butter Tin-Dyson Lakes area of northern Gapp and southern Wlasy Townships has recurrently attracted exploration which has included:

1. dip needle surveys by Mining Research Corporation Limited over a group of 46 claims, and by Mekatina Iron Mines Incorporated over a group of 27 claims, in 1944 and 1950, respectively, and
2. dip needle surveys and geological mapping of 6 claims, geological mapping of 15 claims, diamond drilling of 12 holes for a total of 2545 feet, and geological mapping of 3 claims, carried out by the Exploration Department of Algoma Steel Corporation Limited in 1953, 1959, 1965, and 1966, respectively.

Way-White Township has also received considerable attention in both past and present times. In 1956 exploration work was carried out in this township by Technical Mine Consultants on behalf of a syndicate known as the Five Townships Syndicate which was formed for the purpose of acquiring exploration rights to five townships controlled by Algoma Central Railway. The exploration program included two airborne electromagnetic surveys, staking of 190 claims, and detailed geophysical, geological, and geochemical investigations at various localities of the township. A total of approximately 141 200 feet of line cutting and some local trenching were carried out during the program. During the summer of 1976, Way-White Township was examined as part of a helicopter supported exploration program by HBOG Mining Limited over an area extending beyond the northern and southern boundaries of the present map-area. The exploration program carried out by the former company included geophysical and geological mapping and some local blasting and drilling.

Northwestern Wlasy Township and southeastern Running Township have attracted some exploration activity in recent years. Presumably before 1960, Modern Geophysical Limited completed a ground magnetometer survey on a group of 10 claims in the Vacher Lake area of Wlasy Township. This work was done on behalf of Windy Hill Mining Corporation Limited and in 1960 five diamond drill holes for a total of 1506 feet were completed in the Vacher Lake area by Principle Strategic Minerals Limited. In early 1974 Asarco Exploration Company of Canada Limited entered a joint venture arrangement with Algoma Central Railway with respect to the mineral rights of Running Township, and during May of



Quinn R.

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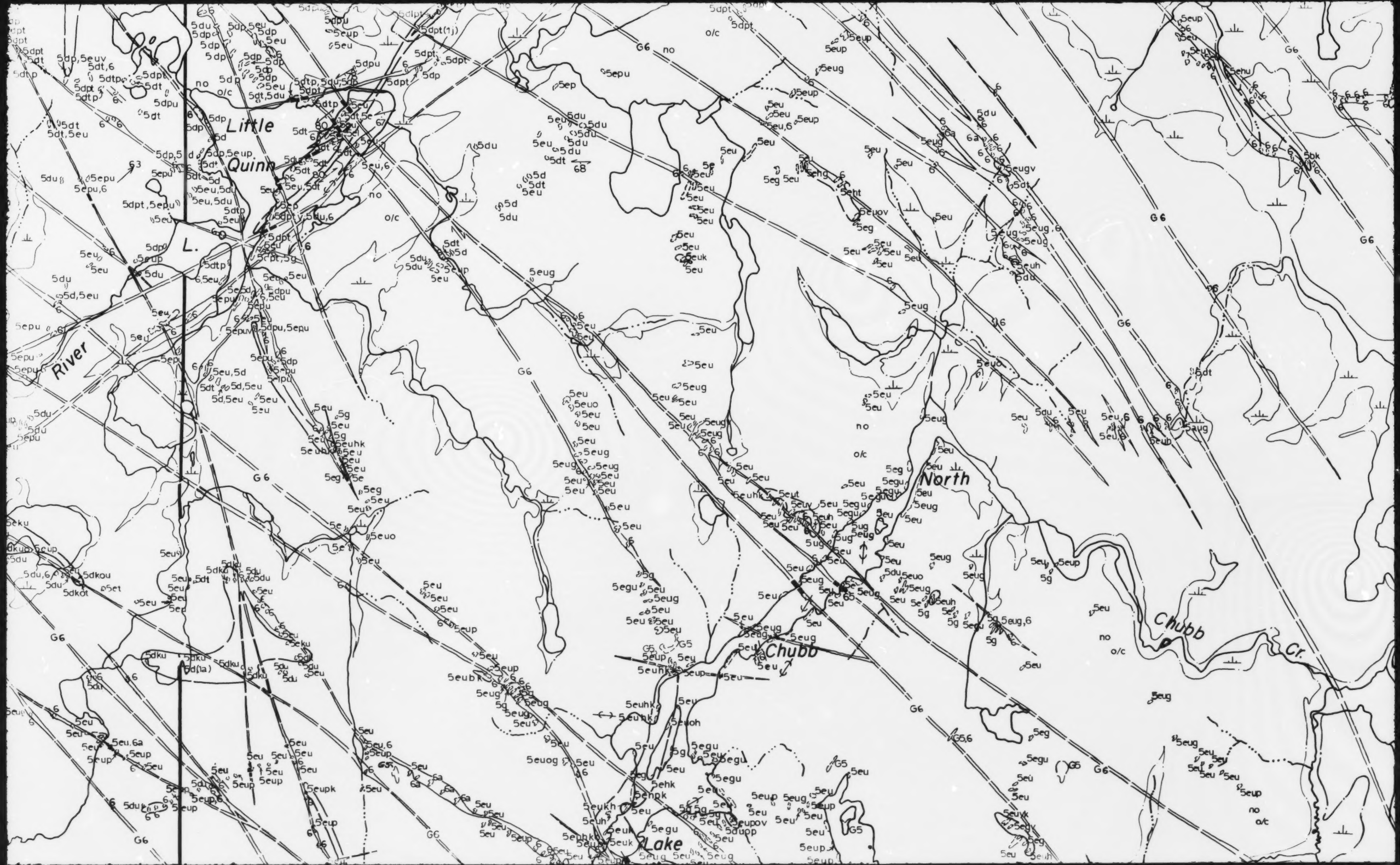
Little
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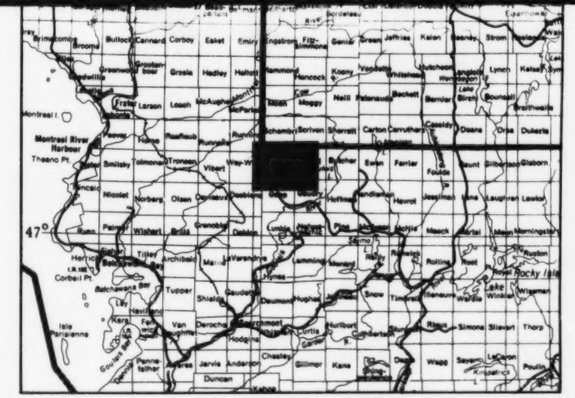

LOCATION MAP

Scale 1:1 584 000 or 1 inch to 25 miles

LEGEND[a]

PHANEROZOIC

CENOZOIC

QUATERNARY

PLEISTOCENE AND RECENT

Minor fluvial, lacustrine, and swamp deposits of sand, silt, and clay. Stratified and locally cross-bedded sand containing variable proportions of pebbles and boulders; erratic boulders.

UNCONFORMITY

PRECAMBRIAN

MIDDLE TO LATE PRECAMBRIAN (PROTEROZOIC)

MAFIC INTRUSIVE ROCKS

6	6	Diabase dikes
	6a	Porphyritic diabase dikes

INTRUSIVE CONTACT

EARLY PRECAMBRIAN (ARCHEAN)

FELSIC INTRUSIVE AND MIGMATITIC ROCKS

FELSIC INTRUSIVE ROCKS

5	5	Unsubdivided
	5d	Biotite granodiorite
	5e	Leucocratic quartz monzonite
	5g	Pegmatite
	5o	Porphyritic: feldspar phenocrysts
	5p	Porphyritic: quartz phenocrysts
	5t	Foliated
	5u	Massive

MIGMATITIC ROCKS

5	5a	Dioritic to tonalitic migmatite
	5b	Containing about 15 percent in volume of groundmass hornblende
	5c	Biotite-hornblende trondhjemitic migmatite
	5h	Containing accessory volumes of groundmass hornblende
	5l	Biotite xenoliths
	5k	Containing discrete hornblende xenoliths of variable size
	5v	*Lit-par-lit* hornblende gneiss

INTRUSIVE CONTACT

METAVOLCANICS AND METASEDIMENTS

METASEDIMENTS

Clastic Metasediments

3	3	Unsubdivided
	3b	Sandstone, siltstone, minor shale, siltstone and

1965, and 1966, respectively.

Way-White Township has also received considerable attention in both past and present times. In 1956 exploration work was carried out in this township by Technical Mine Consultants on behalf of a syndicate known as the Five Townships Syndicate which was formed for the purpose of acquiring exploration rights to five townships controlled by Algoma Central Railway. The exploration program included two airborne electromagnetic surveys, staking of 190 claims, and detailed geophysical, geological, and geochemical investigations at various localities of the township. A total of approximately 141 200 feet of line cutting and some local trenching were carried out during the program. During the summer of 1976, Way-White Township was examined as part of a helicopter supported exploration program by HBOG Mining Limited over an area extending beyond the northern and southern boundaries of the present map-area. The exploration program carried out by the former company included geophysical and geological mapping and some local blasting and drilling.

Northwestern Wlasy Township and southeastern Running Township have attracted some exploration activity in recent years. Presumably before 1960, Modern Geophysical Limited completed a ground magnetometer survey on a group of 10 claims in the Vacher Lake area of Wlasy Township. This work was done on behalf of Windy Hill Mining Corporation Limited and in 1960 five diamond drill holes for a total of 1506 feet were completed in the Vacher Lake area by Principle Strategic Minerals Limited. In early 1974 Asarco Exploration Company of Canada Limited entered a joint venture arrangement with Algoma Central Railway with respect to the mineral rights of Running Township, and during May of the same year electromagnetic and magnetic surveys were flown by Kenting Earth Sciences Limited. Geological and geophysical ground follow-up of this work was carried out by Asarco Exploration Company of Canada Limited in June and August of the same year.

At the time of writing it is not known to what extent the portions of Running and Desbiens Townships which are within the map-area might have been involved in the exploration program carried out in 1976 by HBOG Mining Limited.

STRUCTURAL GEOLOGY

Metamorphic foliation is generally well developed, although locally absent, in the metavolcanics of the mafic series, and is very well developed in those of the felsic series. The dominant trend of foliation, and of the compositional layering in the metavolcanics, is northwest, and the dominant direction of dip of foliation is northeast at steep angles. Northeast- and northwest-trending joints and incipient faults are widespread in the granitic rocks; the northwest-trending joints and the metamorphic foliation in the metavolcanics have apparently controlled to some extent the intrusion of diabase.

ECONOMIC GEOLOGY

It is apparent that most of the older exploration activity was aimed at establishing the potential of the iron deposits of the area; the following refers to work done in 1951 by Mekatina Iron Mines Incorporated (see section on Mineral Exploration):

No reliable estimate of tonnage can be made from the information available. It is estimated that in the broad area south and west of Maud Lake in claim 15705 and on the margins of adjoining ones is a potential orebody 800 feet x 1100 feet which could average 10 million tons per 100 feet of depth. The other bands of iron formation where exposed indicate a workable grade over as much as 270 feet in width and this would make the whole property a potential producer of at least 50 million tons per 100 feet. There is a possibly on three times that much (File 63/263, Mekatina Iron Mines, Assessment Files Research Office, Toronto).

The target of the exploration work in more recent years was apparently the localization of massive sulphide mineralization; no recorded information of further development was found with reference to the exploration carried out by the Five Townships Syndicate in 1956. The area explored by the Five Townships Syndicate is mostly within the contact zone of the felsic and mafic series. At the end of the exploration program carried out in 1974 by Asarco Exploration Company of Canada Limited, nothing of economic interest was found and it was recommended no further work be carried out on the property at that time.

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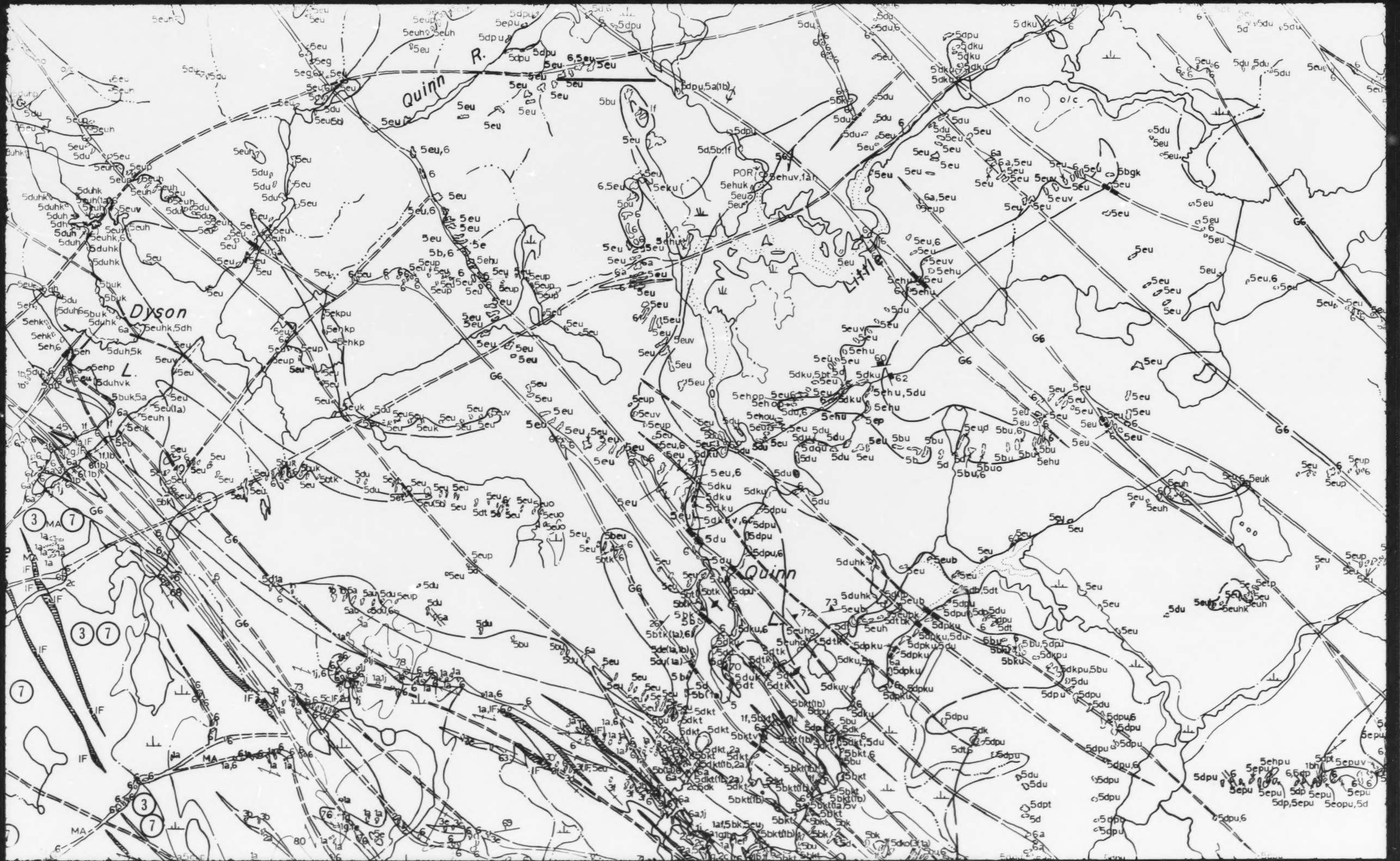
1964: Batchawana-Hubert, District of Algoma, Ontario; Geological Map, scale 1:63 360 or 1 inch to 1 mile. Prepared by The Algoma Central and Hudson Bay Railway Company, Sault Ste. Marie, Ontario by Franc. R. Joubin & Associates Mining Geologists Limited. Geological Mapping by Franc. R. Joubin & Associates, Limited 1960-63.

Moore, E.S.

1927: Batchawana Area, District of Algoma; Ontario Department of Mines, Annual Report for 1926, Volume 35, part 2, p. 53-85. Accompanied by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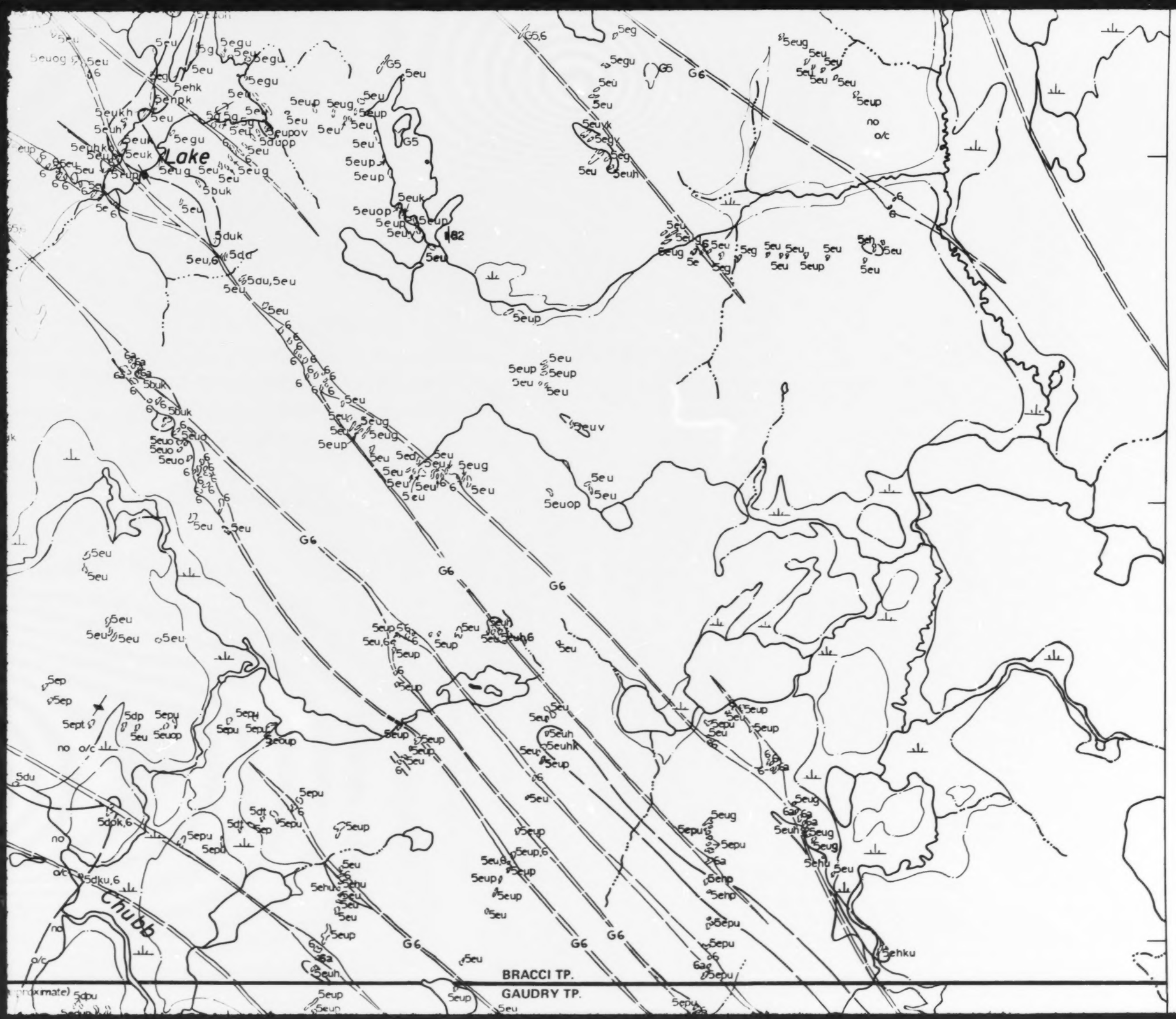
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It is apparent that most of the older exploration activity was aimed at establishing the potential of the iron deposits of the area; the following refers to work done in 1951 by Mekatina Iron Mines Incorporated (see section on Mineral Exploration):

No reliable estimate of tonnage can be made from the information available. It is estimated that in the broad area south and west of Maud Lake in claim 15705 and on the margins of adjoining ones is a potential orebody 800 feet x 1100 feet which could average 10 million tons per 100 feet of depth. The other bands of iron formation where exposed indicate a workable grade over as much as 270 feet in width and this would make the whole property a potential producer of at least 50 million tons per 100 feet. There is a possibly on three times that much (File 63/263, Mekatina Iron Mines, Assessment Files Research Office, Toronto).

The target of the exploration work in more recent years was apparently the localization of massive sulphide mineralization; no recorded information of further development was found with reference to the exploration carried out by the Five Townships Syndicate in 1956. The area explored by the Five Townships Syndicate is mostly within the contact zone of the felsic and mafic series. At the end of the exploration program carried out in 1974 by Asarco Exploration Company of Canada Limited, nothing of economic interest was found and it was recommended no further work be carried out on the property at that time.

REFERENCES

Algoma Central Railway

1964: Batchawana-Hubert, District of Algoma, Ontario; Geological Map, scale 1:63 360 or 1 inch to 1 mile. Prepared by The Algoma Central and Hudson Bay Railway Company, Sault Ste. Marie, Ontario by Franc. R. Joubin & Associates Mining Geologists Limited. Geological Mapping by Franc. R. Joubin & Associates, Limited 1960-63.

Moore, E.S.

1927: Batchawana Area, District of Algoma; Ontario Department of Mines, Annual Report for 1926, Volume 35, part 2, p. 53-85. Accompanied by Map 35b, scale 1:126 720 or 1 inch to 2 miles.

Siragusa, G.M.

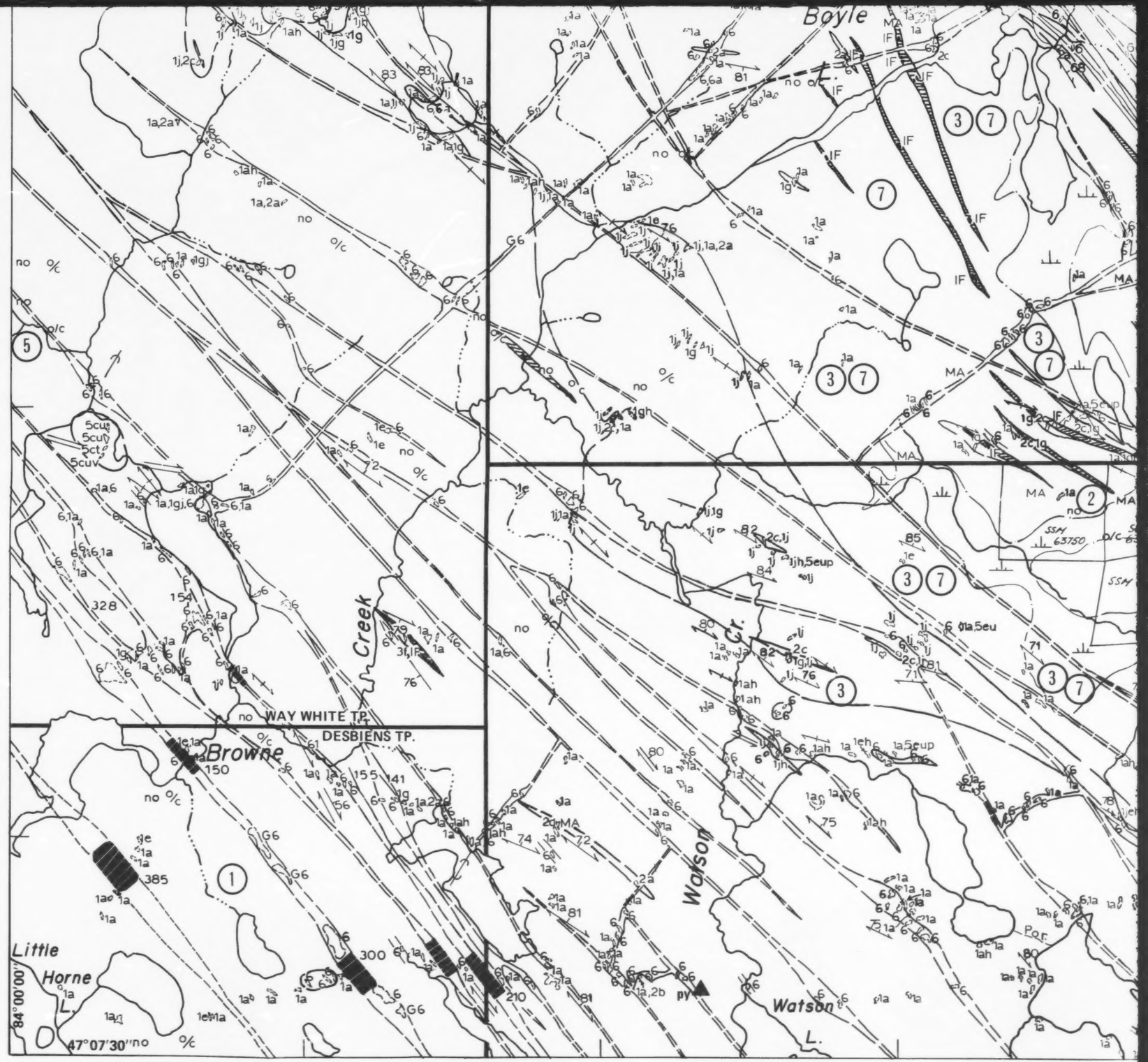
1975: Batchawana-Pangis Area (Western Half), District of Algoma; Ontario *Division of Mines, Preliminary Map P.998, Geological Series, scale 1:15 840 or 1 inch to ¼ mile. Geology 1974.*

SYMBOLS

- Glacial striae; (direction unknown, known)
- Area of bedrock outcrop
- Bedding, top unknown; (inclined, vertical)
- Gneissosity; (horizontal, inclined, vertical)
- Foliation; (horizontal, inclined, vertical)
- Lava flow, top (arrow) from pillow shape and packing; (inclined, overturned)
- Lineation with plunge
- Shearing; (inclined, subvertical)
- Geological boundary, position interpreted
- Jointing; (horizontal, inclined, vertical)
- Small folds with plunge
- Diamond drillhole; inclined
- Diabase dike, trend measured
- Diabase dike, width in feet
- Metal or mineral occurrence
- MA — Magnetic attraction

ABBREVIATION

py ..... Pyrite



WLASY TP.

GAPP TP.

Searchmont road
(position traced from airphoto
73-4706-37-46) 2a

Browne

Buffer Twn

SSM 63747

SSM 63750

SSM 63743

SSM 63746

SSM 63736

SSM 63744

SSM 63751

SSM 63740

SSM 63739

SSM 63735

SSM 63741

SSM 63734

SSM 63738

SSM 63742

SSM 13975

SSM 13976

SSM 13977

SSM 14004

SSM 13974

SSM 13973

SSM 13969

SSM 14002

SSM 13970

SSM 13971

SSM 14000

SSM 14001

Chubb

Creek

BRACCI TP.

GAUDRY TP.

bush road(position approximate)

road

road

Point L.

Point L.

The letter "G" preceding a rock unit code indicates that the lithology was interpreted or inferred from geophysical data.

PROPERTIES AND OCCURRENCES

1. Algoma Central Railway
2. Algoma Steel Corporation Limited (Mekatina Iron Occurrence)
3. Algoma Steel Corporation Limited [1966]
4. Coates, C.W.
5. HBOG Mining Limited [1976]
6. Humbleford Exploration Limited [1968]
7. Mekatina Iron Mines Incorporated [1952]
8. Principle Strategic Minerals Limited [1960]
9. Windy Hill Mining Corporation Limited [1960]

SOURCES OF INFORMATION

Base-map derived from maps of the Forest Resources Inventory, Lands and Waters Group, Ontario Ministry of Natural Resources.

Regional Geologist's File, Ontario Ministry of Natural Resources, Sault Ste. Marie, Ontario.

Quinn Lake Area, Algoma District, by G.M. Siragusa, Ontario Geological Survey, Preliminary Maps P.1833 and P.1834, scale 1:15 840 or 1 inch to ¼ mile, 1978.

Mississagi Reserve and Goulais River Iron Ranges, by E.S. Moore, Ontario Department of Mines, Map 34d, scale 1:63 360 or 1 inch to 1 mile. Accompanying Annual Report for 1926, Volume 34, part 4, 1927.

Algoma Central Railway, Assessment Work Files, Sault Ste. Marie

Magnetic declination, approximately 6°53'W, 1976.

Geology is not tied to surveyed lines.

Metric Conversion Factor: 1 foot = 0.3048 m.

CREDITS

Geology by G.M. Siragusa and assistants, 1976.

Every possible effort has been made to ensure the accuracy of the information presented on this map; however, the Ontario Ministry of Natural Resources does not assume any liability for errors that may occur. Users may wish to verify critical information; sources include both the references listed here, and information on file at the Resident or Regional Geologist's office and the Mining Recorder's office nearest the map-area.

Issued 1982

Information from this publication may be quoted if credit is given. It is recommended that reference be made in the following form:

Siragusa, G.M.
1982: Precambrian Geology of the Quinn Lake Area, Algoma District; Ontario Geological Survey, Map P.2580, Geological Series-Preliminary Map, scale 1:15 840 or 1 inch to ¼ mile. Geology 1976.